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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Method and Apparatus for Laminating and Subsequent Embossing of Webs

- We, MASCHINENFABRIK BRIEM-HENGLER & CRONEMEYER K.G. of 45 Adlerstrasse, Krefeld, Germany; a German company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- The present invention concerns a method and apparatus for laminating web-like and woven fabrics, fleeces or the like with web-like plastics foils and subsequent embossing of the coated fabric web in an embossing roller gap.
- Apparatus are already known by means of which films emanating from a wide slot nozzle of an extruder are joined to web-like commodities in a roller gap and simultaneously embossed. In these apparatus, however, there exists disadvantage that with simultaneous laminating and embossing a certain relatively high pressure between the counter roller and the embossing roller is necessary in order to deform the surface in accordance with the embossing roller. The pressure against the sprayed on fully plastics material, for example, thermoplastics material is however so high that e.g. in a connection of tricot as backing material the extruded film is forced through. In this case the individual meshes of the tricot cut through the thin foil resulting in the plastics material film no longer being retained in its entire thickness.
- Similar disadvantages and difficulties naturally also occur when treating fabrics having a coarse structure. If, a thicker coating is to be applied it is necessary in circumstances for only the surface of the foil to be deformed, whilst the backing material of the commodity has to remain flat in its entity and must not be deformed. This however is not possible if laminating is carried out directly from the extruder nozzle in the embossing roller gap, as the plastics compound is plastic in its entirety and thereby is so deformed between the counter roller and the embossing roller that the backing material also assumes a similar surface to that of the embossing roller.
- An apparatus has become known furthermore wherein strip-like foils are applied in a roller gap on a thermoplastic foil which first passes over a heating cylinder, which then together with the backing foil are carried past a heat radiating source and in a subsequently connected embossing roller gap the connected fabric web is embossed. This known arrangement is not suitable however for laminating web-like or woven fabrics, fleeces or the like with web-like plastics foils and the subsequent embossing, as the connection of both foils is effected only at the brief point of connection of the gap. Furthermore the heating of the heating drum connected at the front is inadequate to connect in the pasting gap a fabric web with the plastics material foil, as the two pasting rollers are not heated.
- An object of the present invention is to eliminate the above-mentioned disadvantages.
- According to the present invention a method of laminating web-like fabrics with web-like plastics foils and subsequently embossing the coated fabric web in an embossing roller gap is characterised in that the plastics material foil arriving from an extrusion nozzle or other storage source is fed together with the fabric web substantially perpendicularly in a first roller gap formed by a heating cylinder and a pressure application roller, the heating cylinder being at least partly embraced by the two webs and the temperature of the heating cylinder and the application

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pressure of the pressure application roller are so chosen that the webs when wound off the heating drum are bonded together by the heating drum whereupon the laminated fabric web enters via a guide roller directly and in the shortest way or substantially perpendicu-

5 web enters via a guide roller directly and in the shortest way or substantially perpendicu-
 10 larly to an embossing gap formed by an embossing roller and counter roller, heating of the plastics material side being there effected by means of a heat radiation source, the embossing pressure being selected so as to ensure that only a surface deformation of the plastics material side is obtained corresponding to the engraving.

15 A substantial advantage is obtained with this device which consists in that there is obtained an absolutely flat lamination without deforming the surface as the pasting roller arrangement is at the front. For this purpose

20 the temperature of the heating cylinder is so adjusted that just sufficient adhesion occurs between the backing material and the film produced from the extruder nozzle. The completely laminated commodity is then fed to the embossing roller gap having previously

25 been heated to such a low temperature on the plastics material side by means of an additional infra-red radiator that a surface deformation is obtained corresponding to the engraving. The embossing roller is thus cooled.

Also according to the invention an apparatus is characterised by a heating cylinder variable in its temperature arranged together with a pressure application roller having a resilient surface and variable in its applica-

35 tion pressure to form a substantially horizontal embossing roller gap, a draw-off roller arranged on the circumference of the heating cylinder beneath the bonding roller gap, a counter embossing roller arrangement provided beneath the draw-off roller to form an embossing roller gap which is disposed substantially in direction of the perpendicular tangent of the draw-off roller, and an infra-

40 red radiation source located between draw-off roller and embossing roller gap.

The surface of the heating cylinder may conveniently be furnished with a "Teflon" (Registered Trade Mark) covering to prevent the plastics foil from adhering. The surface of the pressure application roller is preferably provided with a resilient silicone covering which is not impaired by the working temperatures of the heating cylinder. When

50 using an extruder nozzle as source for the plastics material foil, it is possible for a "Teflon" (R.T.M.) roller in contact with the plastics material foil to be arranged between the nozzle and the embossing roller gap, and which is displaceable in a horizontal direction at right angles to its axis. This roller has the object of eliminating an irregular flow velocity of the foil and thereby streak formation on the foil.

65 The invention will now be described fur-

ther, by way of example, with reference to the accompanying drawing, in which the single figure is a schematic side view of an apparatus in accordance with the invention.

From a wide slot nozzle 1 of an extruder there is emitted a thermoplastics material film 2. The nozzle 1, adjustable in the direction of a double arrow 5, is adapted to be horizontally displaceable. The "Teflon" (R.T.M.) roller 4 prevents an irregular flow velocity of the plastics material film and eliminates streak formation on the film.

The plastics material foil then enters a gap 6, which is formed between a heating cylinder 7 and a pressure application roller 8. A fabric web 9 enters the gap 6 over the pressure application roller 8 where the heating and the bonding of the fabric web to the plastics material foil begins. The pressure application roller 8 may be horizontally displaceable in the direction of an arrow 10, whereby the maximum application pressure required for the given method may be adjusted. The heating cylinder 7 may also be adjusted to an optimum value with regard to temperature. This adjustment of the temperature and the application pressure causes the two webs to be bonded together in such a manner that just sufficient adhesion between the backing fabric and the plastics material film produced from the extruder nozzle is obtained.

To form the surface of the pressure application roller 8 resiliently, the latter is provided with a silicone covering 11. This silicone covering is also heat resistant. The surface of the heating cylinder 7 is also provided with a "Teflon" (RTM) covering 12 which prevents the plastics material film 2 from sticking to the cylinder.

After wrapping the two webs partly about the heating cylinder 7, these pass after bonding over a draw-off roller 13 arranged beneath the heating cylinder 7. An embossing roller 14 and a counter-roller 15 are arranged beneath the draw-off roller 13 for forming an embossing gap 16 in such a manner that this gap 16 is disposed in the direction of the tangent of the draw-off roller 13. In this manner a perpendicular inlet of connected fabric webs into the gap 6 is obtained. For heating the plastics material layer an infra-red radiation source 17 is provided ahead of the gap 16. In the gap 16 the bonded plastics web is deformed in accordance with the engraving of the embossing roller, without the fabric web being impaired. After the embossing operation, the completed web is fed to a winding device (not shown) via a further draw-off roller 18.

WHAT WE CLAIM IS:—

1. A method of laminating web-like or woven fabrics, fleeces or the like with web-like plastics material foils and subsequently

- embossing the coated fabric web in an embossing roller gap, characterised in that the plastics material foil arriving from an extruder nozzle or other storage source is fed together with the fabric web substantially perpendicularly into a first roller gap formed by a heating cylinder and a pressure application roller, the heating cylinder being at least partly embraced by the two webs and the temperature of the heating cylinder and the application pressure of the pressure application roller being so selected that the webs when wound off the heating drum are pressed together by the heating drum, whereupon the laminated fabric web enters via a guide roller directly and in the shortest way substantially perpendicularly into an embossing gap formed by an embossing roller and counter roller, heating of the plastics material side being effected by means of a heat radiation source, whilst the embossing pressure is selected so as to ensure that only a surface deformation of the plastics material side is obtained corresponding to the engraving.
2. An apparatus for laminating web-like fabrics with web-like plastics material foils and subsequently embossing the coated fabric web in an embossing roller gap, characterised by a heating cylinder having a variable temperature and which is arranged with a pressure application roller with variable application pressure and having a resilient surface for forming a substantially bonding roller gap, a draw-off roller arranged on the circumference of the heating cylinder beneath the bonding roller gap, an embossing roller arrangement provided beneath the draw-off roller, for forming an embossing roller gap which is disposed substantially in the direction of the outer perpendicular tangent of the draw-off roller, and an infra-red radiation source disposed between the draw-off roller and embossing roller gap.
3. An apparatus as claimed in claim 2, characterised by the feature that the surface of the heating cylinder has a "Teflon" (Registered Trade Mark) covering and the surface of the pressure application roller is provided with a resilient silicone coating.
4. An apparatus as claimed in claim 2 or 3, characterised by the feature that when using an extruder nozzle as source for the plastics material foil, a "Teflon" (RTM) roller contacting the plastics material foil and adapted to be horizontally disposed at right angles to the axis is arranged between the nozzle and the pasting roller gap.
5. A method of laminating web-like fabrics with web-like plastics material foils and subsequently embossing the coated fabric web substantially as herein described.
6. An apparatus for laminating web-like fabrics with web-like plastics material foils and subsequently embossing the coated fabrics web in an embossing roller gap constructed and arranged to operate subsequently as herein described with reference to and as illustrated in the accompanying drawings.

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